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ABSTRACT

One of the most promising applications of cable television (CATV) is municipal surveillance of public areas for protection against crime, fire detection, control of air pollution, and traffic. Thus far, however, the CATV industry has made minimal efforts to realize the potential of CATV for community protection--the use of cable for public safety purposes has been confined to a handful of communities. For example, several Florida CATV systems operate weather bureau hotlines, Kansas has an "Emergency Alert" channel which is often used for locating lost or runaway children, a station in West Virginia has devised an efficient fire alert and public address system, closed circuit street surveillance and burglar alarm systems have been initiated in Olean, New York, and apartment house surveillance systems have been installed in Sarasota, Florida. These modest applications of cable technology for public safety purposes make it evident that considerable innovating and technological development will be necessary for some of the predictions for its use to be realized. Further, consideration will have to be given to psychological and social consequences of applications such as intense police surveillance of high crime areas. It is clear, however, that the medium holds considerable promise for public safety improvement. (SH)

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CABLE TELEVISION AND PUBLIC SAFETY

by

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A Report Prepared for the
SLOAN COMMISSION ON CABLE COMMUNICATIONS

The opinions expressed herein are the views of the author and do not reflect necessarily the opinions of the members of the Sloan Commission on Cable Communications or of the Alfred P. Sloan Foundation.

Cable Television and Public Safety

Public safety figures prominently in speculation about the future of cable communications. Among the predicted services cited by the Federal Communications Commission are "municipal surveillance of public areas for protection against crime, fire detection, control of air pollution and traffic." New York Mayor John Lindsay's Advisory Task Force on CATV and Telecommunications declared that the medium would "permit our municipal agencies to scan hundreds of public areas for protection against crime and violence, for the detection of fire, for the control of fire, for the control of air pollution ... The person scanning would be able to select which monitoring camera or cameras he will watch."

The Ford Foundation has commented that the ultimate potential of cable "may lie in the services that can be provided by two-way interactive communication, computer links and data transmission, including surveillance in traffic, fire and crime control."

The Industrial Electronics Division/Electronic Industries Association filing with the FCC, "The Future of Broadband Communications," devoted a major portion of its presentation to the impact on crime.

"The ability of local law enforcement agencies to cope with the growing incidence of crime can be expected to decrease steadily," said the IED/EIA paper, "unless alternative means for supplementing

the man on the beat can be supplied. Over the next decade, the technologies of telecommunications should provide increasing support to deal with national and local crime problems. Items such as facsimile pictures of criminal elements randomly accessed to facilitate rapid identification, and closed-circuit video scanning of streets, merchandise, vaults, etc. are two illustrations of the needs of broadband service in this area."

The Ad Hoc Committee of the Industrial Electronics Division that prepared the study predicted annual savings of $3 billion in the area of police protection and $1 billion in fire protection through the application of broadband communications technology.

The CATV industry has made minimal efforts to realize the potential of cable for community protection. Donald Tavenner, president of the National Cable Television Association, refers to this as an "esoteric" application that "hasn't gone very far." Wally Briscoe, managing director of the Association, concedes that developments have "not yet been earth-shaking, but the potential is there." He believes a great deal is in experimental development, but so much is proprietary "people don't even tell us about it."

The use of cable for public safety purposes is confined to a handful of communities.

Several Florida cable TV systems operate weather bureau "hotlines." Emergency weather information is fed by audio over all channels simultaneously.

In Liberal, Kansas, the local cable company has designated Channel 3 of its 12-channel system an "Emergency Alert" channel.

The company installed a special line from the head-end to the police chief's office that enables the chief to originate programs from his office. The office is equipped with a microphone and camera supplied by the cable franchise.

Channel 3 ordinarily broadcasts a map of the area to the accompaniment of background music. In the event of the existence of tornado, dangerous road conditions or other emergency, the system can broadcast information about the emergency by audio and video on all channels. The usual procedure for routine announcements is to employ a tone generator to signal all channels. A brief announcement is made and viewers are advised to turn to Channel 3 for fuller details.

A favorite use of "Emergency Alert" in this city of 14,000 is the locating of lost and runaway children. Police have on hand the photographs of youngsters furnished by the schools. The photograph is broadcast when a parent reports a child missing. It is not unusual in Liberal for a youngster reported lost by an anguished parent to see his picture on television while watching a program at a friend's home. "Emergency Alert" is credited with tracking down at least one runaway after a ticket-seller at the Liberal bus station saw the runaway's picture on TV and recalled selling him a ticket to Wichita.

Prior to 1965, all fire alarm calls in Weston, W. Va., a community of 10,000, were routed through the telephone operator, who notified the fire station. A siren was sounded to summon the city's volunteer fireman, who make up the bulk of the department. The

volunteers responded to the siren either by calling the operator to find the location of the fire or by rushing to the fire station. In response to a request from the fire department to develop a more efficient notification system, the local CATV company devised a closed circuit public address system utilizing the company's cable network.

Fire alarm calls are now routed directly from the fire station to the head-end by telephone line. The calls are converted at the head-end to an FM frequency and placed on the cable, preceded by a ringing sound to alert listeners. All 60 of the fire volunteers were provided FM radios at cost by the cable company management. By attaching the radios to the cable and keeping them continuously tuned to the designated FM frequency at their homes and business offices, the volunteers hear each alarm as the fire is actually reported. The firemen note the reported address and proceed directly to the fire scene.

In addition to providing instantaneous and simultaneous communication of fire information to all personnel, the system serves public address needs of the department. The four full-time members of the department broadcast meetings and other notices of interest to the department over the hook-up. For a total cost of about $1,000, the Weston fire department in effect has its own broadcast system.

William Adler, the Weston CATV operator who devised the system, is considering a similar closed-circuit arrangement to alert personnel of the state mental hospital located in Weston to the escape

of criminally insane patients. Mr. Adler also contemplates using the same system for communicating with civil defense personnel.

The city of Weston is subject to severe flooding. About 20 per cent of the city's homes lie in the flood plain, as does all of the central business district and two major industrial employers. The local CATV company attempts to keep subscribers informed about the flood threat during the flood season by locating a TV camera in a building close to the river and training the camera on the flood gauge. The Weston CATV operation is a 12-channel system. The flood gauge picture preempts one of the channels that ordinarily carries duplicate programming. To spare viewers the inconvenience of staying awake to watch the flood gauge channel, the cable operator has developed an audio alarm to alert subscribers to flood emergencies. The subscriber leaves the TV set on, but with the brightness and contrast turned down to minimize picture tube wear. A loud tone generated over the channel notifies him of approaching flood danger and signals him to tune in the picture.

Allband Cablevision of Olean, N.Y., a division of TeleVision Communications Corp., initiated a closed-circuit street surveillance system in downtown Olean, a city of 22,000, in September 1968. The system consisted of eight cameras mounted on city light poles. The cameras covered 75 per cent of the city's busiest street and were tied by cable to monitors in the police station. Police at headquarters were able to pan the cameras right and left, move them up and down, zoom and adjust for focus and exposure.

Allband Cablevision installed "virgin" cable for the street surveillance operation. Michael Arnold, manager of the company, said he chose separate cable because the company did not have cable in the downtown area to serve subscribers. Mr. Arnold maintains that if the company's regular cable had been laid in the area, he would have serviced the surveillance operation as part of his CATV system by placing the pictures generated by the street cameras in the "midband" of his 12-channel system. In most systems, this would require two-way capability -- a means of moving the picture back over the cable to the head-end for re-transmission. Mr. Arnold believes local CATV companies are logical installers of surveillance systems even when the pictures are not carried on their CATV cable because of their cable know-how and ability to provide service.

The Olean system was developed by TeleVigil Systems, Inc., a special division of TeleVision Communications. The company invested approximately $250,000 in the project to demonstrate the feasibility of TV surveillance. Mr. Arnold estimates the same system could now be installed for $30,000-$40,000.

No charge was made the city of Olean for the installation. The arrangement with the city called for a five-year contract at $6,500 a year if and when the city agreed to assume responsibility for the operation. A new contract was to be re-negotiated at the end of the five-year period.

The system was initiated in September 1968, and terminated December 1969. Allband Cablevision dismantled it following criticism of the surveillance network during the municipal elections the

preceding fall. William O. Smith won election as mayor after describing the system as an "eye in the sky" and charging it smacked of invasion of privacy. Mr. Smith also contended it would be too expensive and that it did not function effectively at night. A resolution was introduced in the city council calling for removal of the cameras, but the system was taken out without formal council action.

The expense charge referred to the possible ultimate costs to the city. No city money actually was expended for the experimental program. The lack of effective night pictures was conceded, but the introduction of new low light level cameras was expected to provide 24-hour surveillance.

Olean's 16-month experience with video street surveillance presents a mixed picture. The police chief believes the presence of the cameras reduced burglaries and freed manpower for other duties. The cameras reportedly were useful in calling police attention to traffic jams, a malfunctioning railroad crossing gate, panhandlers and congregating youngsters. Mr. Arnold attributes the hostility of Mayor-elect Smith to Mr. Smith's employment by the local telephone company. But concern about the privacy aspects of TV surveillance, its effectiveness and ultimate costs evidently was substantial enough for Mr. Smith to campaign on the issue and to succeed in removing the cameras.

Less publicized was a burglar alarm-surveillance system installed as a part of the street surveillance set-up in Olean. Commercial customers were offered the opportunity for cameras to be

placed on their premises and connected by the same cable to police headquarters. One bank installed the surveillance alarm for a nominal charge of $15 a month. Mr. Arnold estimates the same installation could be made on a regular commercial basis for $40 monthly.

The bank alarm consisted of several devices in the bank for manually signaling police headquarters. When an employee activated one of the devices, a bulb lit in headquarters. Police responded by switching on the TV camera, observing the interior of the bank on a TV monitor at headquarters and making a videotape of the picture. No break-ins or hold-ups occurred during the time the surveillance alarm was in operation, but one alarm was inadvertently signaled. Police turned on the camera, saw nothing was happening and were spared responding to a false alarm.

At least one CATV company, in Sarasota, Florida, has installed a limited surveillance system for several apartment houses on its cable. The company mounts a camera in the building lobby entrance and telecasts a picture of the lobby on an empty channel. Cable subscribers in the building can view persons entering and leaving the lobby by tuning to the channel. The same type of visitor surveillance is possible in apartment buildings equipped with master antennas. It has been discontinued in some places due to tenant objections on privacy grounds.

In the process of installation is a burglar alarm-fire alarm-"panic" button system designed by the Advanced Research Corp. of

Atlanta, Georgia. The corporation reports that a cable TV company in a southern city has contracted with it for a pilot installation in 250 subscriber homes.

"Our idea," states the company, "is to provide a relatively low cost central station alarm monitoring system that could be applied on a mass basis throughout the community." The company's system consists of sensing devices in homes and businesses linked to transponders which are continuously monitored from a central station. Two-way communication to operate the system is provided by the CATV cable and a second cable stranded along with the main cable. The company cites as the principal advantages of multiple cable low cost and reliability. It asserts that a relatively small extra cable can provide about 1,000 channels for data transmission for a sizable community without the use of repeater amplifiers.

Signals from the fire and burglar sensors would be triggered automatically and be picked up by the central station monitoring unit. The panic button would require manual triggering. This signal would also be subjected to continuous monitoring. The company claims the same system can be expanded to cover 100,000 homes using extra cable of less than 1/2 inch diameter. The pilot installation in 250 homes is scheduled for completion in March, 1971. Advanced Research Corp. states that the same cable operator, who prefers to be unidentified for the present, has contracted for a similar installation in another city.

The modest applications of cable technology for public safety purposes make it evident that considerable innovating and technological development will be necessary for some of the glowing predictions to be realized. Fundamental questions bearing on usefulness and technological and economic feasibility will have to be answered. At this point, even authoritative sources are required to engage largely in guesswork. When the Electronic Industries Association was asked for specific details on its projected annual savings of $4 billion for police and fire protection services, John Sodolski, staff vice president of the Industrial Electronics Division, replied, "Those projections were a consensus of the best judgments of a number of men in our industry. There is no documentation behind these numbers, except as there may be individual marketing projections in the files of the various companies these gentlemen represent." He added that "the kind of information you desire may be generated" by a new Broadband Communications Section in the process of being formed.

Television surveillance, one of the most often cited public safety applications of CATV, provides a good illustration of the uncertainties. This application usually is described in terms of surveillance of high-crime neighborhoods. These neighborhoods almost always are in low-income, ghetto areas. Would residents of these areas tolerate the close police monitoring of their activities associated with electronic surveillance?

The President's Commission on Law Enforcement and Administration of Justice noted that most crimes against the person occur

on the streets or in other public premises. Heavy police patrolling appears to be associated with a decline in crimes against citizens walking the streets. Street surveillance by camera can be regarded as nothing more than the presence of an officer at a fixed point 24 hours a day. But many persons are likely to resent intensive police surveillance, human or mechanical. While the President's Commission conceded that massive police presence probably would reduce the incidence of street crime, it concluded that "few Americans would tolerate living under police scrutiny that intense." Roger Reinke, assistant director of the Professional Standards Division of the International Association of Chiefs of Police, believes citizen concern over the "Big Brother" aspects of TV surveillance will prevent its acceptance.

Some law enforcement specialists question the utility of street TV surveillance on strictly law enforcement grounds. Edwin Shriver, police programs specialist in the U. S. Justice Department's Law Enforcement Assistance Administration, regards TV as having "very limited application" chiefly because of its lack of mobility. He notes that a suspect need only turn a corner or duck into an alley to be out of camera range. He considers street surveillance to be of minimal value to business establishments because most attacks against businesses occur at side or rear exits.

Though the Law Enforcement Assistance Administration has funded several video street surveillance projects, the projects were initiated at the local level, approved by state agencies and financed

with federal funds allocated to the states. Mr. Shriver's views on street surveillance are reportedly shared by others in the law enforcement funding agency. He believes, however, that video could be useful in observing traffic, especially on bridges, in tunnels and other critical places, and when employed flexibly for investigative surveillance of particular dwellings or locations.

The New York City Police Department uses television for surveillance both by helicopter and on the ground at several fixed points -- the United Nations, City Hall, Bryant Park and outside the Court House during a controversial trial of Black Panthers. The helicopter TV pictures are relayed by microwave. The other video pictures are transmitted by coaxial cable furnished by the telephone company. Several of the cameras are manned by police, others are operated by remote means from police headquarters. The sites of the fixed cameras were chosen primarily because they are areas where large numbers of persons congregate and are potential trouble spots. Deputy Chief Inspector William J. Kanz, one of the New York department's top communications men, sees TV surveillance having important law enforcement value if it can be employed flexibly by shifting cameras from area to area as needs arise.

Experimentation with TV surveillance on streets, in subways and in a variety of other situations will be necessary to determine the extent to which the practice is acceptable to the public and helpful to law enforcement. It will be necessary also to determine whether CATV is feasible for this purpose. The several street

surveillance projects funded through the Law Enforcement Assistance Administration are closed-circuit systems operated on especially laid cable. To provide a comparable service, most CATV operators would require two-way capability. It also would be essential to assure video security to the law enforcement agency. Simultaneous viewing of all surveillance cameras by police would require allocating a separate channel for each camera.

These technical requirements can be met, but it remains to be seen whether this is an economically feasible CATV use. In any case, Chief Kanz is sufficiently enthusiastic about the propsects of employing cable for surveillance and other law enforcement purposes to have conducted talks with TelePrompTer and Manhattan Cable TV, two New York franchise holders, about utilizing their cable systems.

New York police now must wait several days for the telephone company to lay cable whenever police desire surveillance at a particular site. Chief Kanz visualizes tapping into the cable system at will wherever CATV cable is located in the city. The chief has requested that the city's franchise department consider requesting the companies to develop two-way capability on their existing cable systems to serve the department or to lay separate, dedicated cable exclusively for police use.

The angibuity that characterizes the question of TV surveillance is evident on other aspects of public safety and cable. Walter Key, Program Manager of Electronics and Communications in the Justice Department's Institute of Law Enforcement and Criminal Justice, contends

that "no clear-cut use has been identified for law enforcement purposes where cable is superior to existing forms of communication." One possible exception, he adds, is the transmission of documents which would be more rapid by cable. Mr. Key believes that cable does not loom large in law enforcement planning in part because firms are not thinking in terms of cable and investing in research in view of the uncertain status of the CATV industry and the lack of availability of cable systems in many communities.

A more optimistic view is expressed by Scott Hovey, director of the St. Louis Police Department's computer center and the department's consultant on communications. The St. Louis department is one of the few to make a major commitment to television. The department operates its own television station on an Instructional Television Fixed Service Channel, an over-the-air channel ordinarily reserved for educational institutions. Mr. Hovey believes St. Louis made a mistake going to over-the-air telecasting rather than developing a cable-based system.

The St. Louis channel is used to communicate with personnel at each of nine district police stations. The daily lineup of arrested persons is videotaped and broadcast to all officers at rollcall. Videotape is also used to record crime scenes for re-broadcast. Officers gathered at the district stations for rollcall are provided up-to-date video information on wanted subjects, missing persons, stolen property, runaways, labor strikes and community unrest situations. The department has used TV against counterfeiting by videotaping blowups of circulating bills and instructions on how to spot them and to apprehend suspects.

A major use of the St. Louis police channel is for training films and other in-service training programs. Taping of lectures makes it possible for experts to instruct officers on all three shifts through a single lecture session. In the case of live lectures, a talk-back device in each district close to the TV receiver permits officers to ask questions and make comments. Approximately 200 St. Louis officers attend classes at three junior college campuses. Identical classes are scheduled during day and evening hours to mesh with the shifts worked by officers. The department plans to eliminate the duplication by taping class sessions and telecasting them immediately preceding or following tours of duty.

The St. Louis channel operates on a frequency that cannot be received on the ordinary home receiver. The ability of "ham TV" operators to intercept programs limits the use of certain wanted persons and other information sent over the channel. Mr. Hovey believes that coaxial cable would provide greater security while serving other needs of the department in addition to performing the same tasks as the existing over-the-air channel.

Among the extra advantages of cable cited by Mr. Hovey are the high-speed transmission of computerized crime information in digital form and the transmission in image form of police reports that are too lengthy and costly to digitalize. An example of the latter is a police theft report. These reports are now hand-written, reproduced and sent within the department by mail. Mr. Hovey is confident that video pictures made into hard copy will become the accepted method for sending such reports.

He believes that by going to cable the St. Louis department could have attached street call boxes to the cable at less cost than it now takes to lease telephone lines for the boxes. The cable could at the same time provide police with multiple video channels and high speed facsimile capability.

New York's police department also has access to over-the-air television in the form of Channel 31, the city-owned and operated television station. It is possible to achieve privacy by scrambling. Police use of the channel is restricted to certain time slots and the channel is regarded as having limited value.

Chief Kanz is an enthusiastic supporter of cable as more versatile and useful than over-the-air TV. He is confident that once the city becomes wired by the CATV companies, it will be cheaper and more advantageous to tap into the systems for necessary surveillance than to rely on telephone company-laid cable.

New York police plan shortly to transmit finger-prints on TV cable and have hard copies of the prints made from the video tube at the receiving end. The recipient office would then return criminal records by facsimile. Chief Kanz believes the same operation could be performed on CATV, provided there is suitable security, and that utilizing the cable for facsimile reproduction would result in more rapid transmission.

Chief Kanz agrees with Scott Hovey's assessment of the potential value of cable for law enforcement. It is noteworthy that both men, serving departments which have sophisticated communications networks and access to over-the-air television, regard cable as an important public safety resource.

What may be good for New York and St. Louis law enforcement agencies is not necessarily beneficial for other areas. The nation's law enforcement system is fragmented into upwards of 30,000 police forces, more than 80 per cent of them with fewer than 10 full-time officers. Police departments range in size from a single man operating out of a patrol car to 30,000 men directed from a central headquarters and numerous neighborhood precincts. Community public safety problems cover a similar wide range. Any discussion of ways cable communications may aid public safety necessarily will have greater relevance to some communities than others.

The London Metropolitan Police Force has long recognized the usefulness of television by employing TV to provide the public with advice on crime prevention, to solicit help in obtaining information about specific cases, to present the problems with which police are faced and to secure public co-operation. CATV's potential for directing programs to particular neighborhoods and audiences makes the public information role of CATV of special significance. Regular or special programs could be employed to inform a neighborhood or community about crime reports, to warn of patterns of criminal conduct, to instruct in crime prevention and to publicize pictures of wanted persons. The Liberal, Kan., system of broadcasting emergency notices by audio and video on all channels could be adapted to make possible extremely rapid dissemination information about wanted persons, vehicle license numbers and related data to aid apprehension of suspects.

The growing use of motion picture cameras to record hold-ups and police use of videotape could facilitate identification, especially when the films and tapes are widely broadcast. A recent study of the efficacy of various means of identification concluded that still photographs are less reliable than pictures portraying a moving subject from various angles. The study showed that "video tapes and color photography are statistically superior to black-and-white photography in facilitating the identification of suspects. ...There is reason to believe that the video medium is superior to color photography as well as to black-and-white photography."

The most potent police use of CATV may well be as a medium for improving police-community understanding. As the Task Force Report on the Police of the President's Commission on Law Enforcement and Administration of Justice warned:

"Police-community relationships have a direct bearing on the character of life in our cities, and on the community's ability to maintain stability and to solve its problems. ...The police department's capacity to deal with crime depends to a large extent upon its relationship with the citizenry. ...No lasting improvement in law enforcement is likely in this country unless police-community relations are substantially improved."

The commission's studies showed "serious problems of Negro hostility to the police in virtually all medium and large cities." The Task Force concluded that police departments "must become increasingly aware that isolation from the neighborhoods they protect can interfere with good policing as well as good police-community relations."

The Task Force endorsed formation of citizen advisory committees on citywide, neighborhood and precinct levels to conduct police-community dialogues, air grievances, elecit citizen views of police practices, dispel rumors and explain police procedures. Formation of ad hoc committees representing specific minority groups was also urged. Such committees would have value chiefly for the relatively few persons who participated in the sessions. Televising of citizen advisory committee meetings, including the beaming of neighborhood and precinct committee sessions to the affected localities, could substantially enhance their effectiveness.

The Task Force observed that the "modern urban police department needs closer citizen contacts to maximize its integration into neighborhood life." The neighborhood meeting, coupled with citizen participation through telephoned comments and questions, broadcast throughout the neighborhood, offers a partial means of overcoming the isolation of citizens from police. Videotaping and rebroadcasting of pertinent parts to police could be helpful in making police aware of the nature of citizen complaints.

A prime purpose of police-community relations programs is to alert police to tension-breeding situations. CATV could be an important resource for police-community relations units to defuse explosive local conditions.

Citizen negligence is a major contributing factor to crime. In the District of Columbia, 20 per cent of break-ins were through unlocked windows or doors. Forty-two per cent of all stolen cars in the United States had the ignition unlocked or the keys visible.

Insufficient lighting, inadequate locks and breakable windows are associated with a high percentage of business burglaries.

In Des Moines, Iowa, police have conducted a crime prevention course to educate businessmen to cope with robberies, larcenies and bad checks. In Oakland, California, police have distributed weekly bulletins, including information and pictures of bad-check artists. These and other crime prevention measures readily lend themselves to video presentation. In the words of the President's Commission on Law Enforcement and Administration of Justice's Task Force on Police, "Public education to alert citizens and businessmen on how to avoid becoming victims of crime can be a valuable adjunct to a crime control program."

The National Laboratory of Urban Communications, an applicant at one time for a CATV franchise in Kansas City, Missouri, proposed broad-scale use of cable broadcasting for public safety purposes. Its plan included programs to publicize the "Crime Alert" telephone number, to inform viewers of the advantages of anonymous crime reporting, to provide a rumor control service, to further police recruitment, to report the disposition of complaints against police and to serve as a "community forum."

Police in several cities attempt to alert merchants to crime situations through pyramid telephone warning systems. Upon receiving reports of check fraud, shoplifting, confidence game or other offense likely to occur in series, police telephone liquor stores, grocery chains, gas stations, clothing stores and other appropriate businesses. These merchants in turn telephone others, passing along

descriptions when available. In some places merchants have set up alarms to notify businesses within a radius of several blocks. The frequency with which certain crimes are committed in series has resulted in the apprehension of appreciable numbers of suspects through merchant warning systems.

The closed-circuit public address system in Weston, W. Va., is readily suited to merchant alerts. Merchants need only have an FM radio attached to the cable and tuned to a prescribed frequency to receive all crime warning information over the network. The information could be sent over the closed-circuit channel directly by the merchants who call in the reports, in the same way that fire alarms are broadcast directly in Weston, or be relayed by police who receive the calls and choose appropriate reports to be put out over the merchant alert channel. In either case, use of the FM system would be more rapid and save police time. It would avoid the necessity of making multiple telephone calls and the risk of encountering busy signals.

Coaxial cable is richly endowed with FM channels. The cable is capable of accommodating about 100 separate FM broadcasting frequencies per video channel. Perhaps as many as 50 can be received without interference. It is possible for external devices to assure voice security and to enable signals to be received while the FM set is off to advise the owner to tune in for a message. (In Weston, the volunteer firemen, utility companies and other FM users on the cable keep on their sets around the clock.)

Of the 21,500 fire departments in the United States, 20,000 are manned by volunteers. The volunteer departments use various methods to communicate fire alarm information to members, among them sirens, over-the-air radio and "fire phones" that ring several telephones simultaneously and provide the same message to those who respond.

Communication by cable has the advantage of avoiding further radio spectrum congestion, which is already severe in many parts of the country. The low cost for installation of the Weston system -- about $1,000 -- suggests it would be cheaper than a conference telephone set-up. A closed-circuit cable system permits instantaneous notification of everyone tied to the cable in contrast to the limited numbers reachable at one time by "fire phones."

The multiplicity of FM channels on the cable makes it useful for maintaining contact with auxiliary police, off-duty fire and police, snow removal and other emergency service personnel. No method exists for maintaining contact between local civil defense headquarters and shelters in the event of a civil defense emergency unless a shelter is located in a part of a building that happens to have a telephone. Cable could provide a closed-circuit link between local civil defense headquarters, shelters, police, fire and other agencies concerned with civil defense emergencies.

Many police departments are unable to contact off-duty officers except by telephoning them individually. A closed-circuit public address system could be used to summon them for emergencies and for inter-departmental announcements. A department could broadcast its

police radio calls on the FM channel for off-duty officers to keep abreast of situations in their neighborhoods and to respond to them. This would be in keeping with the practice in several cities of increasing police presence by equipping off-duty police officers with police cars.

Some authorities visualize cable ultimately being employed for alerting police, fire and civil defense personnel individually or by squad or platoon, obtaining a response and transmitting scrambled video and speech to authorized persons.

High police visibility is a deterrent to crime. When New York City assigned uniformed patrolmen to every train during the late night hours, crimes on the subways dropped 36 per cent. The President's Commission on Law Enforcement and Administration of Justice concluded, "Large numbers of visible policemen are needed on the streets." Yet many police man-hours are spent not on patrol but in processing prisoners and in court to testify.

A substantial portion of the time spent in court is in connection with speeding and other moving motor vehicle violation cases. The large number of motorists who ignore or neglect to respond to traffic tickets on the specified dates while police are on hand to testify frequently results in the police appearance being a total waste of police time.

The New York City Budget Bureau has estimated that it takes 9½ hours of a police officer's time to process a prisoner through the arraignment stage each time an arrest is made on a felony or serious misdemeanor charge. The Budget Bureau has proposed employing closed

circuit television to demonstrate the feasibility of speeding the process and eliminating unnecessary detention.

The proposed demonstration would link a designated precinct house and the Criminal Court by TV cable. The cable would provide the means for conferring to draft the complaint, to conduct the interview to determine eligibility for release without bail and for arraigning the accused. Fingerprints would be transmitted to the Identification Bureau via photographic facsimile or television and mug shots would be reproduced from the arrestee's television image. The image would be transmitted to the Identification Bureau and automatically converted to hard copy. The Budget Bureau proposes moving gradually from arraignment via TV to use of the system for transmitting direct police testimony in non-jail misdemeanor and traffic cases.

Authorities in Dade County, Florida, have applied for a federal grant to establish closed-circuit TV between four to six precinct stations and magistrate chambers at the Dade County jail. The system would be used to conduct pre-trial release interviews, arraignments and preliminary hearings. The object of the proposed Florida program is to weed out an estimated 18 per cent of "bad cases" promptly and to save police time.

New York Budget Bureau officials believe that CATV could be the means for expanding use of the system if the proposed single-precinct demonstration showed expansion to be warranted.

In the case of police testimony in traffic cases, CATV origination points in precinct stations, fire houses and other places convenient to police on the beat could make it possible for police to be

notified by radio to proceed to the nearest point to testify via cable without the necessity of time-consuming waiting and trips to court. Such a procedure would necessitate two-way audio and video communication. It also would be necessary to establish that testimony by television satisfies the constitutional right of confrontation by one's accusers and does not adversely affect cross-examination.

Facsimile reproduction of legal documents by cable provides another method of maximizing police time on the beat and speeding the apprehension of suspects. Search warrants and arrest warrants could be reproduced and picked up for execution at station houses and other fixed points. It may be possible for an officer to "appear" before a magistrate by cable TV, present his warrant request, and receive the warrant and conduct the search or make an arrest in a matter of minutes.

Rapid arrival of police at the scene of a crime correlates closely with likelihood of arrest. A study of emergency calls in Los Angeles found that the time between receipt of a call and police arrival averaged 6.3 minutes in offenses subsequently not cleared by arrest. In cases where police were able to make an arrest, the average response time was only 4.1 minutes. The arrest rate was 62 per cent when arrival time was one minute, 57 per cent for two minutes and 49 per cent when the delay was six minutes. Almost 36 per cent of all arrests were made within a half-hour of the commission of the offense.

A call from a citizen usually initiates police action. The more rapidly a call for aid can be made, the smaller the time lag in

police arrival and the greater the likelihood of apprehension. The Commission on Law Enforcement and Administration of Justice's Task Force on Science and Technology cited widespread availability of street alarms as one method of enabling citizens to summon aid quickly. The Task Force noted that if fixed alarms were located 40 to the mile in high-crime areas, the maximum distance to the nearest alarm would be 1/80th of a mile. It would take no more than 11 seconds to cover this distance even if it was walked at a pace of only four miles an hour.

New York City is now in the process of facilitating street emergency calls by converting street fire signal boxes for use by citizens to summon fire and police aid by voice communication. In cities without existing signal or voice boxes, it may be more practical to construct a street emergency call box system using the CATV's coaxial cable. The Advanced Research Corp. of Atlanta, Ga., reports it has developed a voice call box system geared to operate in neighborhoods served by CATV, provided a separate cable is laid for two-way communication. A study by the company for the city of La Habra, California, concluded it would be less costly to install its system for street fire alarms than to expand the existing system, which uses telephone wire pairs. The company states the communications capacity of the cable would enable the call box to be used for a variety of purposes, including tie-ins with numerous fire and burglar alarm sensors in neighborhood dwellings.

Most calls for fire, police and other emergency aid are by telephone. The confusing array of public safety organizations and

telephone numbers, especially in metropolitan areas, is one of the roadblocks to reducing response time.

An American Telephone and Telegraph study found that about 40 per cent of emergency calls are placed each day by calling "Zero" (Operator). The operator determines the nature of the emergency and calls the appropriate agency. The 40,000 emergency calls to operators are a fraction of 1 per cent of the 14 million calls handled daily. A.T.& T. Vice-President H. L. Kertz has declared:

"Reliance on telephone company operators acting as an emergency service bureau has inherent limitations which make it less than ideal as a general system for modern metropolitan areas. Operators are necessarily chosen and trained to handle ordinary telephone traffic, such as person to person long distance calls. ...Telephone company operators cannot be expected to have the same background and training in handling emergency calls as attendants at a specialized emergency switchboard might have. ...A second call by an operator to an emergency agency...involves unavoidable delay. Fluctuations in the volume of traffic handled by operators are such that calls to the operators are sometimes subject to longer delay than is acceptable in emergency situations."

A single emergency number has been proposed to eliminate the confusion of multiple numbers and to increase speed of response. The Bell System in 1968 announced the availability of "911" for use as a universal emergency number. The number has been employed to date in few communities. A major stumbling block is the fact that telephone exchange boundaries frequently do not coincide with the jurisdictions of local police, sheriff's and fire departments.

CATV's potential for placing emergency signaling devices in each subscriber's home makes it a possible means of providing a fast and simple call for aid. The Versacom system developed by the Advanced Research Corp. features an emergency button which when activated records on a display monitor showing the location of the alarm. The alarm can then be relayed or switched to a responding agency. It presumably would be possible for a subscriber to be furnished separate emergency buttons for police, fire and other aid.

Authorities are notified of an emergency either by a witness to an event or by sensors that detect the presence of an intruder or fire and automatically signal an alarm. "Silent" alarms are serviced by private alarm companies. The alarms are either received by central stations maintained by the companies and relayed to police and fire departments or are sent directly to police and fire stations.

The value of alarms in reducing police response time and apprehending burglars is illustrated by the experience in Cedar Rapids, Iowa. Intrusion alarms were placed in 350 businesses in 1969. A federal grant made it possible to install them mostly in gas stations, grocery stores, taverns and other small businesses that usually cannot afford alarm systems. The businesses were selected on the basis of crime statistics that made them appear to be likely criminal targets. The alarms are connected directly to the police station by telephone wire pairs leased from the phone company.

In the first 18 months of the project, Cedar Rapids police caught 40 persons in the act of burglarizing the establishments. This is more burglary apprehensions than in the previous four years combined.

Police have succeeded in reducing their response time to the alarms to two minutes. In addition to the burglars caught on the premises, police found evidence of break-ins but nothing stolen in about 200 places equipped with the alarms. Cedar Rapids police theorize that in many of these cases burglars fled after being tipped off by accomplices who spotted arriving police.

A study by the Small Business Administration shows that small businessmen bear the brunt of the losses from burglary. In 1967-68, the loss from burglary for all American businesses totalled $958 million. Small businesses -- defined as firms with annual receipts of less than $1 million -- accounted for $677 million, or 71 per cent.

The Senate Select Committee on Small Business declared in 1969, "Within any community location...a substantial number of all businesses and of retail establishments go without protective service of one kind or another... A substantial majority of businesses go without any major form of protection such as a central alarm or a protective service."

An alarm costs between $200 and $500 a year to install and maintain. Almost all alarm systems operate on leased telephone lines. Telephone line charges account for 15 per cent to 20 per cent of the total annual charge. In Cedar Rapids, the phone company initially submitted a charge of $8.50 a month for telephone lines per alarm. The company subsequently reduced the charge to $6.50 monthly, plus $10 for each hook-up. Many phone companies charge by distance. Even though the alarm may be located across the street from the police or commercial central station, the distance is figured from the alarm site to

the monitoring station by way of the telephone exchange. Cedar Rapids Police Chief George Matias has commented:

"The problem of telephone lines charge is a major stumbling block in the way of large-scale use of alarms since it is a recurring charge. Even the simplest alarm system would require a basic cost of $66 a year for line charges. Methods of reducing or eliminating the cost should be investigated."

The Small Business Administration study noted several drawbacks to reliance on telephone lines, including the increasing cost of line charges and the prohibitive costs to businesses located far from the monitoring station. In examining alternatives to use of telephone lines, the SBA report stated:

"If coaxial cable were to become the general method of communications, the implications become far-reaching. The single carrier going into each business, home or other establishment could carry telephone, television, fire alarms, civil defense alarms, and of course, crime alarms. The multiuse economics would increase competitiveness. In effect, then, alarm systems could become public utilities, privately owned and operated commercial central stations, with a billing of the approximate order of magnitude of that for electricity or telephone."

More widespread use of alarms could substantially decrease the loss from burglary. This would be especially true if coupled with more rapid police response to alarms. The 1969 Small Business Administration study concluded that it was possible within 10 years to cut the average police response time of five minutes to 60 seconds or

less in high crime areas. A response time of a minute or less would produce estimated on-site capture rates of as much as 90 per cent. The Small Business Administration study states that cable could be one of the major contributors to achieving that goal both by providing the means for distributing alarms and facilitating communications from central stations.

High false alarm rates make widespread installation of alarms a two-edged sword. False alarm rates of 90 to 95 per cent are not uncommon. Enormous amounts of police time are wasted responding to false signals. The problem has caused several cities to consider imposing fines on commercial central station operators for each false alarm. The likelihood of an alarm being false has prompted Los Angeles police to give lower priority to burglary and robbery alarm calls.

Alarms tied to TV cameras that permit video surveillance of the premises and audio alarms that transmit the sounds actually made by an intruder are among ways of checking on an alarm and partially coping with the false alarm problem. Both types of alarms lend themselves to employment in cable systems.

Early detection and reporting of fire is as important in safeguarding life and property from fire as early detection and reporting of crime is in apprehending criminals. The movement nationwide is toward ultimately requiring the installation of fire detection systems in all multiple dwellings and detection systems coupled with extinguishing systems in all high rise and commercial buildings.

A recent study of the fire protection needs of Des Moines, Iowa, by Gage-Babcock and Associates, a leading fire protection consulting

firm, illustrates the stress being placed on private protection devices. The report recommended that "consideration be given to requiring all except single and two family residential property be provided with either automatic detection or automatic extinguishing systems, arranged so that actuation of the system will automatically transmit an alarm to the fire department. ...It is recommended that an educational program, strongly encouraging all homeowners to install home fire detection systems, be developed."

Cable systems could provide the means for much wider dissemination of fire detectors and alarms. Fire alarms are more reliable than burglar alarms and create less of a false alarm problem. The data-carrying capacity of cable may make it possible to inform fire authorities of the nature and extent of fires, rather than just the bare fact of the existence of fire. The New York City Bureau of the Budget has under consideration the possible use of sensors in connection with cable systems to record and transmit the amount of heat and other indicators of the size of the blaze to enable the department to make a judgment on the equipment to dispatch. The New York Budget Bureau is also considering cable as the means for communicating the call for equipment from the central station.

A principal cause of police delay in arrival at the scene of a crime is the lack of ability to pinpoint the location of police cars. The result is that a car is sometimes dispatched when a nearer one is available. The Task Force Report on Science and Technology for the President's Commission on Law Enforcement and Administration of Justice recommended research on two types of car locator systems. In

one of the proposed systems, each car would emit an identifying signal which would be picked up by sensors and sent back to the police communication center by land lines. The Hazeltine Corporation has done field tests on a similar vehicle locator system in New York City. The company has noted that the fixed stations needed to receive the signal from the vehicle and to relay the information back to a central station may be provided by video cable. Similar fixed stations, or "signposts" on the cable, have been proposed to determine the location of appropriately equipped individuals who trigger personal distress alarms.

Police response time is slowed in many places by inability to transmit messages as a result of radio spectrum congestion. The magnitude of the problem is illustrated by a recent study of 43 police radio networks in the Lake Michigan metropolitan area between Chicago and Milwaukee. The study found that 12 of the networks "are saturated, that is, all of the messages generated during a busy period cannot be transmitted during that period without shortening messages, transmitting several simultaneously, or deferring some until a later time. Over 2½ million people are served by these networks." Excessive radio message delays were experienced by 31 of the 48 networks. These serve more than 3½ million persons. To meet present needs adequately, communications capacity has to be tripled in the area. By 1980, capacity would have to be increased an estimated 5½ times.

The problem is not confined to police radio communications. The President's Task Force on Communications Policy cited "spectrum

scarcity and congestion" in connection with fire, ambulance and emergency services generally.

William B. McMahon, technical director of the Illinois Institute of Technology's Law Enforcement Science and Technology Center expects the congestion to cause 90 per cent of police transmissions ultimately to be by "hard wire." He believes police agencies are going through a cycle -- from communicating by call box, to radio, to wire again -- the wire of the future to be coaxial cable serving as the message carrier for low-power police car transmitters. To the extent that cable provides police and other agencies a substitute for radio communication, or ultimately frees over-the-air television channels for police and other emergency services, it can make critically important public safety contributions.

Rehabilitating offenders is at least as important as apprehending them. A census of the nation's jails conducted March 15, 1970, for the Law Enforcement Assistance Administration showed that on that date 160,863 persons were incarcerated in 4,037 city and county institutions. The total city and county jail population accounted for nearly half of all adults in correctional institutions. About 65,000 of the local jail inmates were serving sentences, 10,000 for a year or more. Yet most jails are devoid of even minimal rehabilitation programs.

The census found that 85 per cent of the 3,300 jails in large cities have no recreational or educational facilities of any kind. Richard W. Velde, associate administrator of the Law Enforcement Assistance Administration, noted, "Most prisons have at least some correction

and education programs. It is clear that many jails don't even have that." An earlier study by the Task Force on Corrections of the President's Commission on Law Enforcement and Administration of Justice found that only 3 per cent of total jail staff in the U.S. perform rehabilitative duties and that on the average there is one psychologist for each 4,300 jail inmates and one academic teacher for each 1,300 inmates.

The channel capacity of cable television makes it possible for some of it to be used to reach inside jails to provide access to rehabilitation services. This could be in the form of programs, geared to the special needs of jail inmates, spelling out the services available. Community agencies that supply welfare, medical care, family counseling, vocational training, legal aid, drug therapy and other services could describe them in detail and request interested inmates to sign up for visits by agency representatives. The programs could be videotaped and repeated periodically. Television could also be the means for providing academic instruction and up-to-date information about job openings for inmates being released on bail or by discharge.

Current thinking in corrections stresses the importance of treating institutionalized offenders in community-based institutions rather than in remote prisons. CATV could be of increasing importance as these institutions are developed. Penitentiaries with access to CATV may also find it practical to use the systems for programs for inmates, in-service training and possibly surveillance.

Most convicted adult and juvenile offenders are not in jails or prisons but in the community under parole or probation supervision. At any one time only one-third of offenders are in correctional institutions, the rest on parole or probation status. Parole and probation officers are supposed to work closely with offenders and reintegrate them into the community. The President's Commission on Law Enforcement and Administration of Justice found that in practice the officer "is almost always too pressed to do this well. Probation and parole supervision typically consists of a 10- or 15-minute interview once or twice a month, during which the officer questions and admonishes his charge, refers him to an employment agency or a public health clinic and makes notations for the reports he must file."

The commission reported a need for vastly more personnel, for grouping offenders with similar problems into specialized caseloads and for mobilizing schools, employment services, vocational training and other community resources to aid probationers and parolees.

Much of parole and probation supervision must necessarily be personalized and face-to-face. But CATV could be a useful tool for addressing caseloads grouped according to the similarity of their problems, such as drug users. Special programs for parolees and probationers could inform them of job openings among firms willing to hire persons with prior records, provide information about housing and help establish contact with community service agencies.

Almost all public safety agency personnel can benefit from in-service training. A recent report prepared for the California Council on Criminal Justice observed that "the average police officer's training

has a half-life of less than ten years. Put another way, about one-half of what a policeman studies at an academy and in a police science curriculum may well be obsolete within a decade."

The California study, conducted by San Diego State College's Institute of Public and Urban Affairs, surveyed local police agencies and found "nearly all departments were dissatisfied with their present level of training and thought an optimum level would be about twice the present amount... Nearly all respondents were in favor of presenting some of their departments' training via television... Enthusiasm for the use of television was evidenced by the general response by departments that they would use ten hours of televised training per month, or more than twice their total present amount of training."

Police questioned in the survey said they believed TV would be valuable for instruction in patrol techniques, legal aspects of law enforcement, civil disturbances, traffic procedures, courtroom procedures, disarming suspects, demonstrating safe driving, police-community relations, report-writing techniques, contact with juveniles, crime scene investigations, surveillance techniques and dealing with domestic disturbances.

The study found only a third of the departments were using television for in-service training and this use averaged only 1.5 hours a month. The report concluded:

"There is need for greatly expanded training of criminal justice personnel... Conventional methods of training simply cannot meet the need. There is no possibility that funds can be found to adequately expand and improve our present training system along conventional

lines, While utilization of television will cost money, the return as measured by capacity to reach greater numbers with more effective training materials will exceed that to be gained from increased spending for conventional training."

The report recommended a statewide system for disseminating training materials for criminal justice personnel, including the formation of a statewide video network. The report said one method of achieving the objective of widespread distribution might be "to connect the head-ends of community antenna television systems by means of microwave transmitters." The report urged that agencies in urban areas study the use of cable television for developing joint training programs, and commented, "The rapid growth of community antenna television systems in nearly all California cities offers great potential for specialized program distribution at relatively low cost."

The problems of furnishing in-service training to fire departments are especially formidable because of the frequent necessity to place fire-fighting equipment and personnel in scattered neighborhoods. Cities with a single police station often maintain multiple fire stations. The problem is graphically illustrated by the situation encountered by Gage-Babcock and Associates during the course of its fire protection study in Des Moines, a city with one police station and 14 fire stations:

"During the course of this study, a special training class was conducted for company and chief fire officers. The program was about three hours in length and consisted of several different speakers on several different subjects. In order to reach just the officers

in the department, it was necessary to conduct this class six different times. In this case, half of the officers on a shift attended the program in the morning while the other half attended in the afternoon. This was repeated the following day for the second shift and the day after that for the third shift. Any officers on vacation or sick leave were missed. Each of the speakers not only had to attempt to present the same message six different times but were absent from their regular jobs for the major part of three days. The problem is compounded when an attempt is made at reaching the entire fire force with a training subject. Since the firefighters cannot be brought together as in the case of the officers, it is necessary to go to them. This means instead of six presentations, a total of 42 are necessary (14 stations times three shifts). In other words, a simple training film would have to be shown 42 times and then as many as 60 men might miss it because of vacations and sick leave."

The study recommended a closed-circuit television installation and the purchase of video tape equipment to record and replay the training sessions. Cost of the hardware alone was estimated at $25,000. Such an installation would serve only the fire department. CATV, which is not now available in Des Moines, could provide the department with the same access to its men for training as the proposed closed-circuit system while also serving the police department and other agencies with in-service training needs.

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Technological and economic uncertainties make predictions about the ultimate dimensions of cable's contributions to public safety

hazardous. It is evident, however, that the medium holds substantial promise.

The attempts to date to realize the potential have been few and isolated. No central clearing house exists to record successful applications, to suggest approaches or to exchange ideas.

The development of CATV to serve the public's safety needs is likely to continue to be inadequate, piecemeal and fragmented in the absence of stimulus to encourage the industry to develop programs and services in the public safety sector. Systematic efforts to foster experimentation through demonstration grants, to promote information exchange and to alert community agencies to possible public safety applications are indicated to achieve a reasonable level of use of the medium to serve law enforcement, fire protection, criminal justice and related public safety goals.

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